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Translating perceptions and managing expectations: an analysis of management and production perspectives on machine translation

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ABSTRACT

The use of machine translation (MT) in professional translation tasks can change not only how translators work, but also how projects are managed and the expectations they entail across translation supply chains. Previous research has looked extensively into translators' attitudes to MT but has often ignored important aspects of how translators' views interact with those of other language industry stakeholders. This article presents a contrastive analysis of attitudes to MT which covers management and production perspectives. The discussion draws on semi-structured interviews which were thematically coded and qualitatively examined. The study shows how MT adds uncertainty to translation production networks. It argues that the challenges posed by MT are exacerbated by how the current makeup of the language industry restricts translators' field of influence to texts while possibly alienating them from wider aspects of business strategy. The article makes two suggestions. First, it calls for increased translator involvement in the management aspects of service provision. Second, it emphasises the need for a deeper discussion of MT which, rather than framing the technology itself as a potential 'threat', addresses broader societal issues involving misguided perceptions and mismatched expectations.

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Introduction

Machine translation (MT) has changed practices in language services provision. In some market sectors, translators are now required to use MT as a source of suggestions to be edited and incorporated into the final text. It is well known that translators' words/time productivity can increase when they use MT (e.g., Sánchez Torrón, 2017; Zhechev, 2014). Previous research has also shown that MT use can lead to higher-quality translations, so improvements in productivity do not necessarily have a negative effect on the target text (e.g., Green, Heer, & Manning, 2013). It is not surprising, therefore, that clients may expect larger volumes to be translated in shorter turnarounds when MT is used in a project.

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Translators are at the centre of these changing expectations. Their perceptions of MT can provide answers to how problematic aspects of MT's uptake, including how it affects the translating process, deadlines and costs, can be identified and addressed. Research in this area has consequently paid great attention to translators' views on MT use (e.g., Cadwell, O'Brien, & Teixeira, 2017; Guerberof, 2013; Läubli & Orrego-Carmona, 2017). There have also been discussions of broader aspects of how technology affects the translation market and how it should be approached by translation research (Moorkens, 2017; Olohan, 2017).

However, the fact that translators are often part of complex service provision networks is scarcely studied in relation to MT. Largely due to globalisation, and in a pattern that can also be observed in other industries (see Abraham & Taylor, 1993), language services rely heavily on outsourcing. This means that translation companies frequently provide services to other translation companies which may, in turn, further subcontract specific tasks to independent translators, other businesses and so forth. This model of service provision increases the number of intermediaries between those who generate the product and those who first commission it (see Abdallah & Koskinen, 2007). This model also fragments translation services into a series of steps that can be overseen by different professionals who may or may not have oversight of the entire process. Given the large number of phases and steps involved in these supply chains, the challenges of adopting MT as a professional tool are inevitably modulated by the degree to which different professional constituencies can influence how MT is implemented, managed and used.

Most translators work on a freelance or casual basis (see, e.g., EC, CIOL, & ITI, 2017). While even freelance translators can in principle decide for themselves to offer MT-based solutions to their clients,[1] in contexts where they provide services to other translation businesses their casual status means that despite being front-line users of MT systems they are not full-time employees of the companies that pay for the technology and require its use. Indeed, as translation businesses mature, they make larger technology investments (Sargent, Lommel, & Pielmeier, 2017). It cannot be ignored, therefore, that this can help to polarise translation production networks between, on the one hand, those who have more resources – including capital and data – to invest in state-of-the-art MT and, on the other hand, those who for lack of resources or information may find themselves in the position of being no more than technology users. Conversely, those who manage the adoption of MT in large businesses may not actually use MT in translation tasks themselves. If that is the case, this gives them an indirect perspective on how MT can change cognitive and linguistic aspects of translation.

MT can also widen and diversify expectations of quality (see Way, 2018). In some contexts, translators may be asked to disregard stylistic MT errors and focus on speed and on delivering a translation that is 'fit for purpose' (see Bowker, 2019). This means that, unlike in 'from-scratch' human translation where the expectation of linguistic quality is usually the highest possible, the end-goal in MT-based projects can accommodate textual products with different levels of stylistic and grammatical quality.

The potential for dissonance and broken communication that may arise from the vantage points of management and production teams in relation to these factors has rarely been the object of empirical research on MT. Understanding the challenges that technology brings about for the world of work requires understanding how these challenges interact with the wider professional and economic environment. In the case of translation, this probably involves taking account of the fragmented nature of the language

industry in discussions on technology. Failing to do so risks a poor understanding of not only the nature of specific problems, but also of how increasing human-MT interaction can change professional translation.

This article therefore aims to compare different stakeholder perspectives on MT. It contrasts the views of those in management and production to explore how reconciling these standpoints can lead to enhanced practice and understanding of how MT is managed and used in professional translation. We draw on techniques often employed in content analysis (Stemler, 2001) to visualise and interpret a series of semi-structured interviews conducted with professionals working as part of management and production teams. By 'production' we refer to those who are dedicated mostly to textual translation work. We take 'management', in turn, to include those who manage people or technologies in language services provision. These categories can overlap, so we unsurprisingly came across cases where company owners had started out as translators or where technology managers occasionally carried out translation work. Nevertheless, the interviewees were often predominantly focused on either production or management tasks, so we assigned them to these groups on this basis. We also point out that we investigate the relationship between these two groups primarily in relation to the private sector. The dynamics of institutional, non-professional or pro-bono translation, for instance, are beyond the scope of the study. Similarly, while the analysis does not explicitly differentiate between working for direct clients and for intermediary companies, it predominantly concerns contexts where translators work within a company or where, as independent professionals, they provide services to other translation businesses rather than to direct clients.

We structure the remainder of the article as follows. In the next section, we provide a brief review of previous research on attitudes to MT. We subsequently describe the article's methodology and present the data and results. Finally, we discuss the findings and suggest new ways of approaching practical and conceptual issues involving the use of MT in translation services.

Previous research on attitudes to MT

Most previous work on attitudes to MT concentrates on translators' perspectives (e.g., Cadwell et al., 2017; Guerberof, 2013; Läubli & Orrego-Carmona, 2017; Moorkens & O'Brien, 2015; Moorkens, Toral, Castilho, & Way, 2018; Rossi & Chevrot, 2019). Some previous studies report translators' views on MT and MT post-editing to be predominantly negative, especially among more experienced professionals (see Läubli & Orrego-Carmona, 2017; Moorkens & O'Brien, 2015). Regarding the motivations behind translators' positioning, insecurity or 'fear of MT' can be inversely related to MT's acceptance (Rossi & Chevrot, 2019). The fact that MT is not suitable for certain text types is also a frequent reason why the technology may be avoided (Cadwell et al., 2017).

Most findings mentioned above cover one side of the discussion – i.e., how *translators* approach the use of MT. While these results provide useful and detailed information on the nature of translators' perceptions, they do not explore the perspectives of other parties that may play a role in shaping translators' positioning. Studies providing details of how project managers and those occupying other management roles deal with MT are rare. LeBlanc (2013) interviews 'some managers' (4), but his study focuses on translation memories rather than MT, and the interviews concentrate mostly on translators (4) (see also

LeBlanc, 2017). Based on focus-group interviews, Alonso (2016) discusses situations that can erode trust between translators and clients/managers. While some of these situations concerned the tools to be used in translation projects (Alonso, 2016, pp. 25–27), MT was not the focus of the interviews, in which the management perspective was represented by a single project manager. Another case in point is Sakamoto, Rodríguez, Berthaud, and Evans's (2017) analysis of focus-group interviews involving project managers in the UK (see also Sakamoto, 2019). Sakamoto et al. found that project managers do not always have access to information on how and how much translators may be using MT. However, like most other work in this area this study too provides a non-comparative analysis. In addition, it covers contexts where project managers and translators 'do not discuss use of MT openly' (6). This implies situations where MT use is not inherent to the commission, which is a different context from the one discussed here, where MT use was for the most part an open requirement or request.[2]

Previous research by one of the present authors has found that negative attitudes to MT in professional communities are usually more directly linked to business issues and the technology's impact on the market rather than to the notion that MT may outperform human translators (Vieira, 2018). Importantly, this places emphasis on the practices that surround MT use rather than on MT itself as a focus of discussion, a standpoint that serves as backdrop for the work presented here. In addition, although freelance work is the norm in the language industry, previous qualitative work on perceptions of MT often covers contexts where translators work in salaried positions (Cadwell, Castilho, O'Brien, & Mitchell, 2016; Cadwell et al., 2017; Rossi & Chevrot, 2019). Contrasting different perspectives while also representing the position of freelance workers is therefore a broader desideratum in MT research that this article helps to address.

Methodology

Sampling and participants

We carried out the interviews between 2016 and 2017.[3] All interviews involved a single interviewer (one of the present authors) and a single interviewee, and they were all conducted in English. We conducted thirty interviews in total, but one of them concerned institutional translation, which is outside the scope of the present article. This interview was not considered in the present analysis. Some of the interviews were conducted face to face and some of them by Skype. In addition to our own networks, we drew on the TAUS (Translation Automation User Society) membership directory as a sampling frame for the study. We also approached attendees of the Sociedad Española de Lenguas Modernas Congress in Spain as potential interviewees and posted calls for participants on three online forums: ProZ.com, TranslatorsCafé.com and the ProZ.com Facebook group. We presented general aspects of the data in an industry report (Vieira & Alonso, 2018). The report describes general topics relating to MT use practices, which is a different approach compared to the present study, where we present a contrastive qualitative analysis based on thematic and sentiment coding (see Interviews and coding procedure, below).

The management group includes 18 interviews while the production group includes 11. We do not see this difference as an issue given the qualitative nature of the study. Indeed, while we explore quantitative methods to describe the data (see Results section), we note

that the article does not attempt to present generalisable quantitative trends. Its focus is, rather, on qualitative details of the interview content.

In the management group, three interviewees were project managers, four managed translation tools and MT deployment and eleven had other managerial roles, including owner and/or managing director. The production group included nine freelance translators and two in-house translators. Three translators in the sample worked for companies that are represented in the management group. This is a useful trait of the sample in that it ensured that part of the material reflected professional environments that were shared across production and management interviewees (i.e., where both perspectives corresponded to the same company). We also note that the management group includes three cases where two interviewees worked at the same organisation (as project managers, or as owner/director and technology specialist, respectively). Nine companies from the management group (11 interviewees) were TAUS corporate members at the time of the interview. Seven companies (nine interviewees) were corporate members of the Globalization and Localization Association (GALA). As for company size, in the management group, ten interviewees represented companies with between three and fifty employees, four represented companies with between fifty-one and one hundred, and four represented companies that had over a hundred. The in-house translators in the production group worked at companies with between three and fifty employees, in one case, and over a hundred, in the other. Freelance translators were independent professionals, so company size in their case was equal to one. Especially for the large companies, the type of content the interviewees worked with varied considerably, but the projects underpinning the discussion were invariably non-literary and often technical in nature (involving, for example, patents, software- or hardware-related information and survey data). Details of the interviewees' levels of professional experience and the countries where they worked are presented in Figure 1.[4]

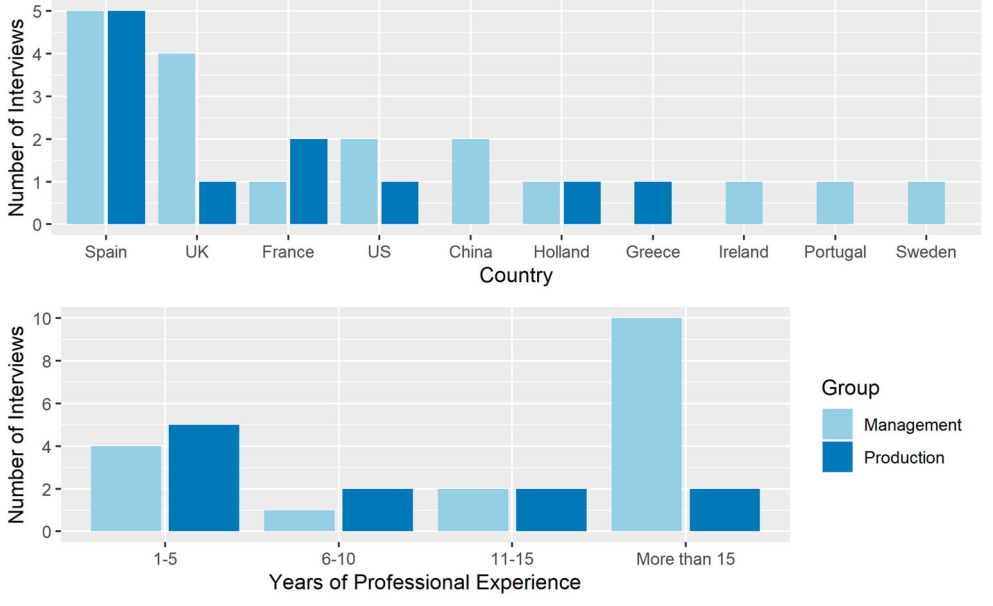

Figure 1. Interviewees' countries and levels of professional experience.

Interviews and coding procedure

The average length of the interviews was 38 min (SD = 11). In total, 18.2 h of interview time were analysed. The interviews aimed to prompt participants to describe objective aspects of how MT was used in their company/work as well as their perceptions of the process. While we relied on a set of guideline questions as prompts (see the Appendix),[5] as per usual in semi-structured interview methodology we did not follow a strict script. We allowed other questions to emerge organically in the conversation and re-worded or clarified any questions where required.

The interviews were transcribed[6] and the transcripts were coded in RQDA (Huang, 2016), an R package for qualitative data analysis. To our knowledge, it is the first time that this package is used in translation research. RQDA allows any textual material to be coded and subsequently described or visualised – e.g., with quantitative methods – based on other functions available in R. We devised a list of thematic 'codes' to analyse the data. Some codes stemmed directly from the guideline topics we established for the interviews (e.g., concerning feedback procedures and different supply chain phases). Some emerged from the data itself (e.g., regarding perceptions of translation technology across time), while others emerged from broad pre-established topics (e.g., translation quality) which were refined and more narrowly structured under specific labels during the analysis. We list the thematic codes below in alphabetical order together with explanations.

- *Assessment* – Procedures and methods for assessing translators' work.
- *Clients' knowledge* – Information, know-how or knowledge that clients may have.
- *Costs and pay* – Any information on rates or payment practices/methodologies.
- *Distinguishing between tasks* – Information on differences between tasks, e.g., concerning distinctions between post-editing, revision and translation.
- *Editing/translation steps* – The different steps involved in editing or translation tasks.
- *Feedback* – Feedback on translators' work.
- *Flow of information* – Communication practices, or lack thereof, aimed at keeping translators abreast of any developments within a project/company.
- *Industrial standards* – Information on ISO standards or any industry-wide guidelines.
- *MT quality* – Appraisals of MT; includes comments on MT outputs and on post-editing.
- *Potential ethical problems* – Information on any practices that could have ethical repercussions.
- *Target-text quality* – Information on target-text quality that does not directly concern assessment practices – e.g., desired standards and target quality levels such as 'good enough' and 'similar or equal to human translation'.
- *Productivity* – Any information on translating productivity, including targets and potential effects of MT use.
- *Profile* – Descriptions of personal or organisational profile – e.g., concerning areas of specialisation.
- *Recruitment* – Procedure for hiring translators to work with MT or for securing jobs involving MT.
- *Supply chain phases* – The different steps in the translation supply chain – e.g., project preparation or different production phases carried out by separate professionals such as 'translate, edit, proof'.
- *Tools/interfaces* – Issues concerning the interaction with specific tools.

- *Training/translators' knowledge* – Any information on translator training or knowledge translators had.
- *Translation technology across time* – Comments on how translation technology has or is likely to change translation tasks.

We applied a collaborative 'four-eyes' principle to the coding process such that all coding instances were revised and cross-checked between the two authors. We established a set of coding principles for the analysis, which were the same for all thematic codes. These principles were as follows. First, to reflect the complex nature of qualitative data, we allowed the codes to overlap – that is, the same stretch of transcript could be classed with more than one thematic code. We also established a pair of question and answer as the minimum stretch of transcript the thematic codes could apply to. This means that even when a code concerned a single comment, the code covered the entire question-answer pair for context. When a topic in the interview lasted longer than a single pair of question and answer, a single coding instance was extended to cover all the content (i.e., we did not repeat codes consecutively). Similarly, when question-answer pairs could not be easily interpreted in isolation (e.g., because they relied on information previously mentioned), the codes backtracked to cover all the content concerned. Lastly, as a general principle, the content of the interviewees' replies, rather than the questions, was the overriding parameter we considered for coding.

In addition to the thematic codes described above, we used a *Positive* and a *Negative* code indicating sentiment. These sentiment codes were used to classify comments on any topic. They had no minimum data unit; the sentiment codes were assigned as precisely as possible to individual comments. The *Positive* and *Negative* codes were not allowed to overlap either. In the context of this analysis, we deemed it illogical to regard a comment as both positive and negative. Moreover, unlike the thematic codes which, together, were aimed at exhausting the data, the sentiment codes were only used when we deemed any comments to be especially negatively or positively charged and where the question did not specifically ask the participant to mention details of which they approved or disapproved (i.e., the sentiment had to be unprompted).[7]

We coded two interviews independently to measure inter-coder agreement. Traditional methods for calculating agreement, such as Cohen's kappa, require the use of mutually exclusive coding categories (Cohen, 1960, p. 38). This was not the approach we adopted, since we allowed the thematic codes to overlap in the analysis. Therefore, we used a recently proposed agreement measure that is fit for situations where a single unit of analysis can be classed with more than one code (Kirilenko & Stepchenkova, 2016). Like Cohen's kappa, the values of this alternative measure, 'fuzzy kappa', usually fall between 0 and 1, where 1 indicates perfect agreement and 0 indicates agreement by chance. Each pair of question and answer was a data unit in the calculation, and we applied no weighting to the order in which the codes were assigned to each unit. The agreement check comprised a total of 137 question-answer pairs. The sentiment codes were not included in this calculation since they did not have a specific data unit in our coding procedure. For these codes, we checked the code counts in the two interviews coded independently to provide an indication of the researchers' individual sentiment assessment.

Based on the software proposed by Kirilenko and Stepchenkova (2016), fuzzy kappa was calculated as 0.55. The value of Kappa that corresponded to a hypothetical 'crisp' one-to-one classification (i.e., what the result is likely to have been had the researchers been forced to select a single code per data unit) was 0.46. The fact that fuzzy kappa was higher than the 'crisp' result confirms that allowing for overlaps of thematic codes in the data provided a more consistent description of the content. Regarding the sentiment codes, the number of *Positive* and *Negative* codes varied by a single code between the researchers apart from *Negative* codes in one of the two interviews used for agreement checking, where the total count differed by 8 codes.

While there is no standard interpretation of fuzzy Kappa levels, the 'crisp' result suggests 'moderate' agreement (Landis & Koch, 1977, p. 165). We note, however, that any disagreements were addressed by the collaborative procedure we applied to the coding. All coding we present was cross-checked and is the result of a consensus. In addition, it is worth noting that we do not see the codes as products in and of themselves. Rather, we draw on the codes as foci of reflection that provide a structure for analysis, which we present below.

Results

Communication and the unknowns of MT

To illustrate how frequently we used each code, Figure 2 shows the share of code counts for the management and production groups. As can be seen, the two groups had similar coding count proportions for most codes, including *MT quality*, *Tools/interfaces*, *Training/translators' knowledge*, *Costs and pay* and *Target-text quality*. Among the least frequent codes overall are *Industrial standards*, *Translation technology across time* and *Potential ethical problems*. The codes with the most discrepant overall proportions

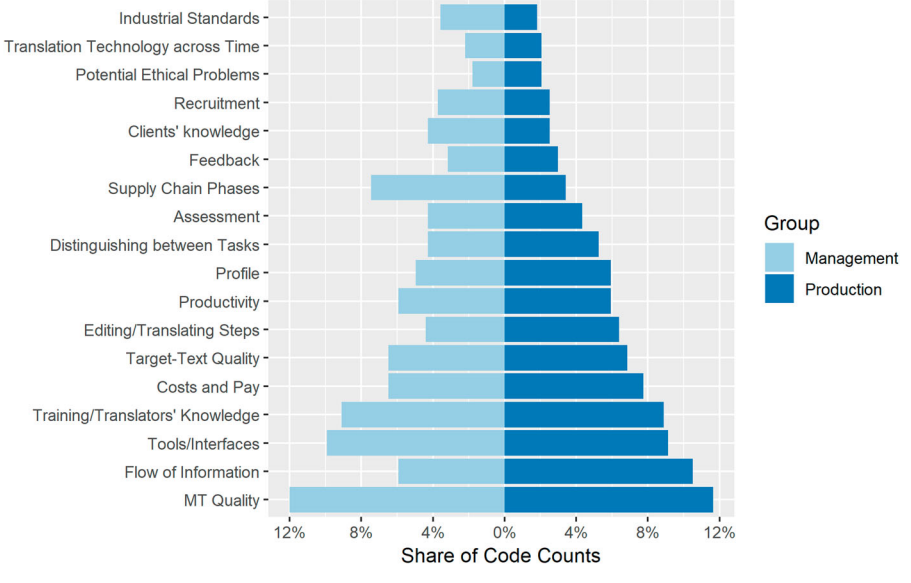

Figure 2. Share of coding instances per code for management (left) and production (right) groups.

between the two groups were *Flow of information* and *Supply chain phases*. These codes were more prominent among translators and managers, respectively. Given how the shares of these two codes are different from the others in the comparison between management and production groups, we use these codes and their links to other aspects of the data as a framework for discussing the analysis in this section.

As mentioned in the Methodology, the *Flow of information* code concerned comments related to access to information that could have a bearing on translators' practice. This included, for instance, issues regarding end-clients' requirements or the target text's real-world context of use. The *Supply chain phases* code concerned the different phases in the overall lifecycle of a project, including file preparation and editing stages carried out by different translators/editors. The distributional pattern of these two codes is not surprising in that it reflects how members of the management group had more oversight of different project phases than translators, among whom there was more emphasis on the quality and amount of information provided. More importantly than distributional differences, however, the content of these codes reflects issues that have direct implications for how MT use is managed.

In addition to the linguistic aspects of how MT changes translation processes, the interviews suggest that from a communicative perspective MT makes projects more complex. A compromise between speed, cost and quality – a triad project managers often refer to as the 'iron triangle' – is necessary in most translation projects. In other words, if clients are on a tight budget, they may need to settle for a lower-quality product or for a slower turnaround (see Bowker, 2019 for an overview). However, when translators are asked to use MT, navigating the speed-cost-quality triad requires especially robust communication channels. For one thing, as implied in the Introduction, guidelines instructing translators to focus on meaning while disregarding issues of grammar and style would be unlikely in the pre-MT age, but this is now a possibility. Quality that is below 'human-level' (Massardo et al., 2016; see also Hu & Cadwell, 2016 for a discussion of different post-editing levels) may now in some contexts be what translators are expected to deliver. Even in projects aimed to deliver human-quality translations, the use of MT may affect pricing and expectations of productivity. All these variables hinge on MT quality, which in turn poses negotiation challenges because precise predictions of MT quality, or of how useful the MT output will be in the translation process, are hard to obtain.

Comments concerning *Flow of information* suggest that there is considerable room for improvement in procedures for briefing translators on information that could affect the variables mentioned above, including quality expectations and client requirements. While some translators, especially those who had long-standing relationships with the companies they worked for, seemed satisfied with the quality of communication in their professional environments, others reported a general sense of detachment from the wider context of MT-based projects. There were calls for more inclusive practices where translators can learn from information such as how the MT output was obtained and why MT was being used. There was also a demand for greater clarity on what constitutes 'success' in a commission. Those in production teams quite often reported situations where their managers seemed to take the path of least resistance by remediating situations only when any queries arose. This was clear in remarks such as: 'In general, translation companies give you the least information possible. They just say "do this" and if they like the content, they're happy; if they don't, they let you know' (Int18 – P).[8] The

interviews suggested that much of translators' often negative approaches to the use of MT stems from some of these practices. Notably, some of those in the management group also recognised that translators were sometimes not provided with information that could affect how they worked. In explaining how translators sometimes over-edited the text or did the opposite and left inadequate MT suggestions behind, a project manager mentioned: 'that stems from us, I think, not being specific enough in what we expect' (Int25 – M).

Flow of information was also closely connected to the *Productivity* and *Costs and pay* codes. A key issue cutting across these three codes was the lack of robustness of current pricing methods. Translators' compensation in projects involving MT was often calculated based on estimates of how much content they were expected to process per unit of time. This in theory acts as a temporal pricing parameter where translators are paid based on how much time they spend on the task. In practice, however, this only works as a temporal measure if translators and managers agree on the level of MT quality in question and the amount of editing the material requires. There were mixed views in this respect among translators. Some were happy with their productivity and pay while others voiced frustrations. More importantly, comments by those who were dissatisfied often suggested over-expectations of MT quality – and therefore of productivity – on the part of managers and/or clients as well as, again, poor communication. One translator mentioned 'I don't think the time they expect you to spend … it doesn't match with reality' (Int7 – P). The challenge of negotiating productivity expectations was also mentioned by managers. In the comment below, an interviewee in the management group described experiencing cases where MT had not increased translators' productivity as much as expected, which can lead to potential conflicts in cases where clients have a limited budget:

> We have had people work straight through, complete the files, but then come back to us and say, 'this has taken me four hours, rather than two'. I always try and negotiate where I can, but because the client is squeezed on budget – which is why they've opted for post-editing – it's not always possible […]. There's always kind of a slight conflict there. (Int9 – M)

Another manager mentioned that some translators declined tasks involving MT if they could not see the MT output in advance since they could not estimate for themselves the length of the commitment: 'when we ask them for their availability, it's usually before the MT is fully set up […] and it's a big chunk of time, so they are usually afraid to commit to a big project' (Int13 – M). These comments illustrate the nature of some of the communication obstacles we observed.

As the use of MT in professional tasks evolves, static editing of MT outputs may lose ground to adaptive and interactive paradigms where MT systems learn on the fly from the edits introduced by translators.[9] This may change expectations of having sight of the MT output beforehand. Nevertheless, even in interactive post-editing or where translators use adaptive MT, pre-estimating the usefulness of MT suggestions, for example for the purpose of quoting for the translation job, will likely continue to be a challenge. Some translators reported pricing mechanisms that attempt to circumvent some of these issues. Among these, the interviewees mentioned actual time-tracking – i.e., where timers embedded in the translating interface keep track of how much time translators spend on a project – as well as retrospective calculations of how much of the raw MT output is edited. This last method involves contrasting the (edited) target text with the raw MT

output, so that discounts can be applied to portions of the machine translation that do not require any edits. However, particularly among translators, these practices can be deemed to provide an unfair reflection of the effort invested in the task (Vieira & Alonso, 2018), so they do not completely solve the issue of pricing in MT-based projects. Indeed, comments on productivity showed how MT use exacerbates a perceived deficit in fairer and more transparent pricing methodologies.

Regarding the *Supply chain phases* code – which was more prominent among managers – it is noteworthy that similar frustrations with the unpredictability of MT are apparent. The management group often reported that, for some clients, time and costs had higher priority than quality. This can directly influence the different phases of a project – e.g., if post-edited MT goes through a separate proofing stage or not – and it also magnifies the potential for some of the communication problems discussed above. Regarding clients' expectations that MT will save time, a technology manager mentioned: 'That's the difficulty. We don't know how much faster it will be, and there are so many factors' (Int22 – M). An in-house translator also voiced frustration with misguided assumptions on the part of clients: 'The client […] just wants something for a certain time. […] there's this whole thread of information that needs to be implanted in the process. You can't just press a button and then it's there' (Int26 – P).

Generally, the *Flow of information* and *Supply chain phases* codes reflected the many unknowns that MT introduces to the lifecycle of translation projects, which were linked to productivity, pricing, editing processes and, not least, MT quality. Indeed, the *MT quality* code underpinned many of the issues brought up by the interviewees, so this code is not discussed here in isolation. It is, however, noteworthy that neural MT (Bahdanau, Cho, & Bengio, 2015) was only mentioned by members of the management group. This suggests that, relative to translators, managers were more familiar with the way MT technology is evolving. Among those who mentioned neural MT, attitudes varied. Some were sceptical about neural MT's results for certain language pairs, for example English to Japanese: 'I don't know why people are saying it's great' (Int10 – M). Others thought the quality of neural systems could shift negative attitudes among translators: 'it [neural MT] certainly can be alarmingly good […] and I think when translators realise that it really does work for their language, that's when their view will shift, hopefully' (Int27 – M).

Although in relation to some specific topics, like neural MT, the interview content differed between the groups, in general the management and production groups did not necessarily disagree on what the problems were. There was, however, a clear difference of perspective which is amplified by the current makeup of the industry. As mentioned in the Introduction, translators and end-clients often have several intermediary parties between them. These may consist of businesses that outsource work to other businesses and there may also be within-company intermediaries who have better access to end-clients than translators. While fragmenting projects in this way may be a logistical requirement of responding to market needs in a timely fashion, the interviews showed how MT can worsen the communication challenges that are already posed by this fragmentation. We came across several cases where translators found themselves relegated to the position of peripheral contributors who lacked detailed guidance and contextual oversight. This is not unproblematic considering that translators' work is, after all, the core of a translation business. On the other hand, MT also posed problems that were particularly challenging for those in management. End-clients expect precise quotes and estimates, but

precision in an MT use setting is by default difficult to achieve. This means that managing translation projects in the age of MT often means managing expectations – from all sides: end-clients', intermediaries' and translators'. A panoramic view of projects can nevertheless give managers a possible advantage in navigating the uncertainty around these issues. We found that managers were often better positioned not only to gain access to relevant information but also to shape broader aspects of a project's business strategy.

Positive and negative codes

We used the *Positive* and *Negative* codes to explore participants' sentiment in relation to the different topics covered by the interviews. These results are presented in Table 1, which shows, for production and management groups, the number of *Positive* and *Negative* codes linked to each of the thematic codes used in the analysis.[10] Table 1 also shows a sentiment score for each thematic code, which consists of the difference between *Positive* and *Negative* code counts – i.e., where a positive score reflects positive sentiment and a negative score reflects negative sentiment.

According to our classification, the management group had relatively similar numbers of *Positive* and *Negative* codes, which suggests a balanced stance that is not disproportionately positive or negative. In the production group, on the other hand, *Negative* codes were more frequent. The three thematic codes with the largest difference between positive and negative comments were *Target-text quality*, *Tools/interfaces* and *Productivity*. We discuss these codes below and show how negative sentiment in the production group often concerned a sense of distance from the business aspects of a project or indeed problems that translators were better placed to notice.

There were a few factors at play in the production group's comments on *Target-text quality*. Some translators mentioned being inherently dissatisfied with the product of their work when they used MT, which is clear by the large number of negative comments

Table 1. Code crossings showing how the *Positive* and *Negative* codes relate to the thematic codes used in the analysis. These results reflect proximity or direct overlap between the sentiment codes and other topics discussed in the interviews.

	Production			Management		
Codes	*P*	*N*	Sentiment score	*P*	*N*	Sentiment score
Target-text quality	3	21	−18	2	1	1
Tools/interfaces	8	25	−17	10	8	2
Productivity	4	19	−15	9	7	2
Flow of information	1	15	−14	3	6	−3
MT quality	20	32	−12	23	21	2
Costs and pay	6	17	−11	8	5	3
Distinguishing between tasks	2	12	−10	4	1	3
Editing/translating steps	4	14	−10	3	7	−4
Assessment	3	11	−8	1	1	0
supply chain phases	3	11	−8	1	2	−1
potential ethical problems	0	6	−6	1	1	0
Clients' knowledge	0	5	−5	5	3	2
feedback	1	5	−4	0	1	−1
Training/translators' knowledge	5	9	−4	6	5	1
Translation tech. across time	3	6	−3	6	1	5
Profile	0	2	−2	2	1	1
Recruitment	0	1	−1	1	2	−1
industrial standards	1	0	1	0	2	−2

that related to the *Target-text quality* code (see Table 1). A sense of detachment from the translation process seemed to underlie these comments: 'I'm not comfortable with the final product. I don't like it; I feel less involved in the quality of the product' (Int29 – P). The *Target-text quality* code also involved comments concerning notions of agency and risk. Translators expressed a clear sense of how, at a textual level, they were the bearers of responsibility for any MT errors that may go unnoticed: 'if anything goes wrong, you can't blame it on the machine, because you're the expert, OK? I can see a lot of scope for things going awry in certain circumstances' (Int26 – P). In addition, there was a generally negative approach to the notion of 'good enough' quality (see Massardo et al., 2016, p. 17) where clients may request translations in which stylistic errors are admissible (see *Communication and the unknowns of MT* section above). Translators' comments in this regard implied a strong sense that their own assessment of the product took priority over the client's: e.g., 'I try not to take these projects where they ask for basic quality because it makes me quite annoyed to do something that is not good enough. Even if they want it that way, I don't like it' (Int24 – P). Comments like these clearly indicate an inherent chasm between certain client requests and a sense of duty among translators to uphold high-quality standards. Purposely overlooking certain errors would in most cases go against translators' training, experience and, more generally, commonly held notions of professionalism. This makes the concept of 'good enough' quality particularly difficult to handle. Compared to clients and managers, translators were much less willing to compromise quality in favour of costs or turnaround.

Also regarding the *Target-text quality* code, managers often reported performing overall in-house checks on content provided by translators or other companies prior to delivery to the client. Where specific quality control structures were applied, these were usually the same whether MT had been used in a project or not. Surprisingly, however, in some cases managers did not feel the need for strict quality assessment structures:

> We generally work with what our clients ask us. We've been considering adopting a more, let's say, formalised QA structure. But it's a matter of what problem you are trying to fix and since we get very, very little quality complaints, we feel that we're doing well, so why would we implement a QA structure. (Int16 – M)

Overall, those in the management group did not report significant quality problems as a result of MT use, which runs counter to translators' sentiment on this issue, as discussed above.

Some comments assigned with the *Tools/interfaces* code transcended MT and referred to computer-assisted translation (CAT) more generally. These included known problems discussed in previous research such as 'locked' segments and the danger of error propagation[11] (see LeBlanc, 2013) as well as how CAT tools can have more features than necessary and in turn overcomplicate the translation process (see O'Brien, Ehrensberger-Dow, Connolly, & Hasler, 2017). The interviews also showed how companies, especially multi-language vendors or larger organisations, might choose to develop their own cloud-based CAT tools. We found client-developed tools to be particularly polarising among translators. Some of them reported very positive experiences: 'what they need to do is just develop their own program […] because, according to my own experience, I have realised that these post-editing programs can be very, very good' (Int23 – P).

Others mentioned client-developed tools as a key source of dissatisfaction: 'I said before and I'll repeat it again: it's such a rudimental interface' (Int3 – P).

Among translators with positive attitudes to client-developed tools, MT quality was a clear underlying factor. While these translators commented positively on these tools in general terms, they often focused on how the quality of the MT output had facilitated the post-editing process when these tools were used. Especially for large clients or multi-language vendors, developing their own tools may make projects easier to manage. However, if these tools do not provide translators with features commonly available in mainstream CAT-tool interfaces, their productivity may be affected as a result. From translators' perspective, therefore, focusing on providing specialised, high-quality MT, preferably in familiar editing interfaces (e.g., translators' own CAT tools), seemed more effective than requiring translators to use in-house tools that may restrict their usual working methods.

Regarding the *Productivity* code, it should be noted that the high negative score for the production group (−15) does not necessarily indicate that translators were dissatisfied with how MT in itself affected their productivity levels. As mentioned in the previous section, we observed nuanced attitudes in this respect: some translators were happy with how MT improved their productivity while others were less enthusiastic. However, negative comments on productivity did touch on problems that sometimes concerned more than just MT. Some of these crossed with the *Tools/interfaces* code, where translators mentioned how being forced to use client-developed interfaces slowed them down: 'this software sometimes … it slows the project and your speed' (Int3 – P). Other issues concerned productivity tracking or enforcement procedures, for example where translators expressed negative views on how productivity can be calculated or on how targets can be enforced: 'you can quantify it and you can try and force it into boxes, but it is still a dynamic process at the end of the day […] I wouldn't like to be pinned down on that [productivity tracking]' (Int26 – P). Overall, given the many factors underlying translators' perceptions of productivity, we argue that any categorical statements in this respect should be approached with caution as they are likely to oversimplify the issue.

As for the management group, as shown in Table 1, the approach to *Productivity* was not as negative compared to the production group. Managers often mentioned how appraising the usefulness of MT beforehand was important: e.g., 'What we also test, when we run tests, is the time it would take a post-editor to bring it [the text] to the level of quality that we think the client wants' (Int11 – M). However, it was also mentioned that running productivity tests incurs costs and not all the companies interviewed could test their MT systems as often as necessary:

> We should do it [MT quality and translating productivity tests] more often or systematically in my opinion. Now we do it only when the engine […] doesn't sound very nice, or when we get feedback from translators, we double check. But that requires a lot of time and resources. (Int22 – M)

Comments like these chime with the earlier discussion on the unknowns that MT may add to a project. Our sentiment analysis suggests that translators felt more strongly about these issues than managers, which is discussed in more detail below.

Discussion: local attachment and global detachment

The analysis presented above shows how MT can change or intensify challenging aspects of translation services provision. Firstly, it is worth noting how translators are inherently attached to the work they produce. Those in the production group often considered translation products to be part of their extended professional identity. On the one hand, like other professionals, translators *should*, after all, strive to uphold high standards, which usually means translating/editing to the best of their ability to produce texts that are intrinsically accurate and fluent. On the other hand, it should be noted that translators often gave more value to their own target quality expectations than to clients'. Here a conflict arises and the fact that MT may involve lower word rates can detract attention from deeper and more challenging problems. Specifically, lower word rates are more likely to represent lower overall income if they come as a result of over-expectations of MT quality and productivity. This means that if MT worsens translators' earning power, this is not to do just with MT, but also with factors that prevent translators from shaping a project's business strategy and having more input into the project's estimating stage.

The interviews provided little evidence of cases where translators' quality expectations were lower than the client's – i.e., where the delivered product was *not* 'good enough'. Translators nevertheless mentioned situations where they declined commissions in which clients' quality expectations were lower than theirs. In addition, productivity projections estimated by clients or intermediaries at times did not match what translators experienced – i.e., sometimes MT did not speed up their work as much as expected. In all these cases, regarding MT as a 'threat' can be an unhelpful disguise that shifts responsibility from the technology's users to the technology itself. The problem in these cases is not MT as such, but rather a matter of mismatched expectations. Especially where MT's benefits are overstated, the issues that may arise require negotiating commissions based on accurate assessments as well as educating end-clients on the many factors involved in incorporating MT into a project. Based on our analysis, we see more room for translator involvement in some of these tasks, ideally in an environment where the perspectives of several stakeholders (e.g., clients', managers' and translators') are directly considered. While clients' and translators' tolerance for 'good enough' or 'fit-for-purpose' translations may differ, more translator involvement in the estimation stages of a project is likely to facilitate communication and the understanding of specific requirements. However, the nature of current service provision networks means that those in the management group are the first and often only port of call in the communication with end-clients. This is not in itself an issue. As mentioned previously, we did observe cases where translators had long-standing relationships with those they dealt with and seemed happy with their MT use experience. Nevertheless, our results suggest that translators' detachment from the wider project is a complicating factor of the challenges brought about by MT.

Notably, especially when clients prioritised time and costs over quality, the sense of duty to the text observed among translators partly gave way, among managers, to a sense of duty to end-clients' needs. Specifically, those in the management group were more flexible in navigating client requests where lower costs or faster turnarounds involved a quality compromise. While compromising on quality is only possible in certain projects (e.g., where the content is for internal use rather than for publication),

we argue that managers' pragmatic approach to these requests is not a coincidence. Managers are often not directly involved with the minutiae of the text. This arguably allows them to make objective and business-oriented decisions 'from a distance'. In the case of translators, by contrast, focusing on the textual core of translation tasks is what gives them their unique selling point. Indeed, in the age of MT, attention to detail is arguably even more important than before. The difficulty, however, lies in ensuring that the challenges of MT are not exacerbated by focusing translators' expertise narrowly on the text. The fact that translators are often many intermediaries away from end-clients makes it harder for them to adopt a business-oriented approach focused on client requests. We argue, therefore, that translators' local attachment to texts and global detachment from wider aspects of a project should be central topics of debate on MT use and management in professional translation. This is because local and global aspects of translation commissions are similarly, if not equally, important in the process of guaranteeing MT's benefits not only for clients and translation managers but also for translators themselves.

Conclusion

This article investigates management and production perspectives on the use of MT in professional translation. The analysis shows how MT can add uncertainty to translation services and in turn exacerbate issues relating to miscommunication and work fragmentation. The study discusses how the increasingly common use of MT in the language industry can change translation projects. The analysis showed how the current makeup of service provision networks risks restricting translators' field of influence to the text while alienating them from wider aspects of a project's business strategy. We argue that this imbalance in the translators' role affects how MT use is perceived and negotiated, which has consequences for those in management as well as production. Based on our analysis of the interviews, we make two suggestions. First, we call for increased translator involvement in estimation and client-communication aspects of translation projects as a way of helping to foster environments in which translators play broader and more integrated roles in translation supply chains. Second, we argue that discussing MT as a 'threat' can detract attention from more serious problems concerning unrealistic perceptions of the technology, mismatched expectations and the often-restricted position translators occupy in service provision networks. We call on research in this area to take account of wider dynamics that affect what translators' remit is perceived to include as well as aspects of how translation services are currently structured.

The analysis of the interviews also has implications for how translators are trained. There has been much emphasis lately on how MT should be integrated into translation curricula and how post-editing and MT engine development skills should have more weight in translation teaching (e.g., Mellinger, 2017; Plaza Lara, 2019). A strong focus on MT is indeed a key component of preparing translators for practice. The fact that neural MT was only mentioned by managers in the present study is not necessarily alarming, but it does give cause for reflection on how important it is for translators to keep abreast of technological developments. Knowing how to train and tune MT engines, in particular, may help to give translators more agency in how they approach specific tasks (Kenny & Doherty, 2014). Being able to follow best practice in MT assessment

and in estimating MT's usefulness is also likely to help overcome some of the communication obstacles mentioned earlier. However, the importance of technology in the curriculum should not overshadow the implications of how translation services are currently structured. The use of MT in professional translation is, after all, closely related to a matter of business. From early research in this area (e.g., Krings, 2001) to the present day there has been a strong emphasis on how MT affects translating effort and translators' productivity. While this work, which includes the authors' research, involves several conceptual questions concerning agency and definitions of translation, meeting market demands and increasing throughput – whether intentionally or not – are also among its motivations and by-products. Translator training should therefore take account of the fragmented nature of the language industry and its business consequences. Being entrepreneurial is a recurrent topic in the freelance training literature (see Jenner & Jenner, 2010; McKay, 2011). The Competence Framework of the European Master's in Translation (EMT, 2017) also mentions business practices under 'Service Provision', and there have been useful proposals for how professional environments can be replicated in translation programmes (Buysschaert, Fernández-Parra, Kerremans, Koponen, & Van Egdom, 2018). However, the business aspects of work fragmentation and efforts to promote translators' leadership have lately arguably come second to the notion of knowing how to use, assess and build translation technologies. We see room for a more radical approach to translation technology teaching which fosters, more than instrumental adaptability, a conceptual understanding that translation professionals should strive to shape the business dynamics they are adapting to.

Finally, it is worth noting that those in management teams were also often affected by the difficulties of reconciling clients' expectations, on one side, and translators', on the other. While our sentiment analysis shows that management and production teams felt differently about the various issues discussed, as mentioned previously they did not disagree on what the issues were. This suggests that, at a practical level, managers and larger translation businesses are also likely to gain from involving translators in tasks that would otherwise take place outside their purview. While this would involve potentially more complex relationships of trust between those involved in a project, we see room for more collaborative models where translators, whether freelance or in-house, can be more integrated into overall teams.

Notes

1. Indeed, 'do-it-yourself' MT training platforms such as KantanMT (https://www.kantanmt.com/) or Slate (https://www.slate.rocks/) arguably make it easier for translators to train their own MT systems (see Kenny & Doherty, 2014). In addition, MT implementation is covered by the competence framework of the European Master's Network (EMT Expert Group, 2017). However, access to data, confidentiality of clients' content and processing power in the case of tools that run locally on the computer are potential obstacles that arguably give larger businesses an advantage over independent translators in how they benefit from MT use.
2. See also Scott (2019) for a discussion of commissioners' and translators' perspectives on how translation projects are managed and executed. Scott's focus is on outsourcing practices in legal translation, though MT is briefly mentioned under the topic of 'tools' (see Scott, 2019, pp. 151–152).
3. The study was approved by the ethics committee at the first author's institution.

4. One interviewee in the management group did not provide us with information on length of professional experience, so the total number of interviews for this variable in Figure 1 is 28.
5. Barring adjustments that changed the interview's focus from a company to an independent translator, the interview questions were largely the same.
6. Some interviews were transcribed by the authors and some by two University of Bristol research interns who worked under the authors' direct supervision. A consistent transcription method was ensured as far as possible across the sample. We adopted a mostly denaturalised transcription approach (Bucholtz, 2000), which means that our goal was to focus on the content rather than on sounds and other speech features such as pauses and laughter.
7. Strong word choice was a key guideline for the sentiment classification. In addition, if participants counterbalanced a negative comment with a positive one (or vice versa), we assigned each specific comment with its corresponding sentiment code (e.g., 'We complained in the past – it was really bad – that it was too time consuming. [Negative] But the last times it has been better. [Positive]').
8. KEY: 'Int18' = Interview 18; *P* = Production; M = Management. We follow this pattern throughout the article to identify the source of any verbatim quotes.
9. See https://www.sdltrados.com/products/trados-studio/adaptivemt/ or https://lilt.com/.
10. To achieve this, we used the crossCodes function of the RQDA package (Huang, 2016) with the relations 'overlap' (where some portion of the transcript classed under the codes in question overlaps) and 'inclusion' (where the stretch of transcript corresponding to a code includes the entire span of another code). Since where necessary our coding included the surrounding context (e.g., previous questions), we note that these results may on occasion reflect the proximity of coding instances rather than an exact overlap of the codes in participants' individual utterances. Our analysis did not show this to be an issue, however. The Positive and Negative Codes section provides more detail of how the sentiment and content codes were connected.
11. That is, when translation memories provided by the client or commissioning party contain errors which translators may be forced to leave in the target text.

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Appendix

Guideline questions – management

- Could you please describe yourself and your job?
- Could you please describe your company? What languages combinations do you offer?
- What kind of services do you provide?
- What do you think about machine translation and post-editing?
- How often do you provide post-editing services? In what type of projects?
- Who decides if post-editing will be used in a project?
- How is a post-editing project quoted? What is your opinion on the rates applied to post-editing?
- To what extent do post-editing rates differ from translation/revision rates?
- How is MT applied to projects? Could you please describe the different stages of the post-editing process in your company?
- To what extent do post-editing projects differ from 'traditional' translation/localisation projects?
- What kind of tools do you use? Do you train/tune MT systems yourselves?
- How are post-editing projects managed in terms of human resources?
- How are post-editors recruited? To what extent do their profiles differ from those of translators/revisers?
- How often do translators receive specialised training on post-editing? What kind of instructions do post-editors receive?
- How is post-editing assessed? To what extent do post-editors get feedback and how is that done?
- How often do you use quality assurance tools or specific quality assurance metrics?
- How often do you follow any ISO (or other standard) procedures?
- How often and to what extent do post-editors provide feedback on the MT system used? To what extent is this feedback used to improve the system?
- What is your overall evaluation of MT post-editing? And of post-editing procedures in the company? What do you think could be improved?

Guideline questions – production

- Could you please describe yourself and your job?
- Could you please describe the type of company(ies) you work for and the type of content they normally need to have translated?
- What language combinations do you offer?
- What do you think about machine translation and post-editing?
- How often do you provide post-editing services? In what type of projects?
- Who decides if post-editing will be used in a project?
- How is a post-editing project quoted? What is your opinion on the rates applied to post-editing?
- To what extent do post-editing rates differ from translation/revision rates?
- How is MT applied to projects? Could you please describe the different stages of the post-editing process in the company(ies) you work for?
- To what extent do post-editing projects differ from 'traditional' translation/localisation projects?
- What kind of tools do you use? Do you train/tune MT systems yourself?
- What is your experience of the selection process for post-editing jobs? To what extent do vendors/managers ask for post-editing-specific skills/certification in your experience?
- How often have you received any specialised training on post-editing? How did this training take place?
- To what extent were your post-editing skills assessed before you were assigned to a certain project?
- What kind of instructions do you receive in projects involving MT?
- How is post-editing assessed? How often do you get any feedback?
- How often do you use quality assurance tools or specific quality assurance metrics?
- To what extent do/does you/your company/company(ies) you work for follow ISO (or other standard) procedures?
- How often have you been asked for feedback on the MT system used? To what extent is this feedback used to improve the system?
- What is your overall evaluation of post-editing? What is your evaluation of procedures carried out in the company(ies) you work for? How could post-editing be improved?
- What is your overall evaluation of your own post-editing skills?